trical receive signal modifies the frequency and phase of that electrical receive signal in such a manner as to permit the coherent combination of the modified electrical receive signals from all of said plurality of transducer elements;

means for combining the electrical receive control signal of each transducer element with an electrical receive signal generated by that transducer;

means coupled to each of said transducer elements for combining the modified electrical receive signals from said transducer elements so as to form a coherently combined array output signal;

means coupled to said transducer output combining means for decoding a combined reflected coded signal in the coherently combined array output signal to produce a decoding means output signal; and means coupled to said decoding means for generating image data from said decoding means output signal.

wherein

Sub A12

2. The apparatus of claim 1, said coded signal is a chirp.

3. The apparatus of claim 2, wherein said decoding means comprises at least one matched filter for coded signal decoding.

4. The apparatus of claim 1, wherein said chirp is a linear FM chirp.

5. The apparatus of claim 1, wherein said array has a size of M rows and N columns and said electrical transmit control signal generating means comprises means for generating individual row and column transmit control signals for each of said rows and columns, the electrical transmit control signal for each transducer element being a combination of the transmit row and column control signals for that transducer.

6. The apparatus of claim 5, wherein at least one of said row and column transmit control signals for a given transducer element contains a frequency based coded signal.

7. The apparatus of claim 5, wherein said electrical receive control signal generating means comprises means for generating individual row and column receive control signals for each of said rows and columns, the electrical receive control signal for each transducer being a combination of the receive row and column control signals for that transducer.

8. The apparatus of claim 1, wherein said coded signal includes a frequency based code.

9. The apparatus of claim 1, wherein said array is a one dimensional array with a plurality of rows and one column.

10. The apparatus of claim 1, wherein said array of transducer elements comprises M rows and N columns, where M and N are positive integers and at least one of M and N is greater than 1;

at least one of said transmit control signal generating means and said receive control signal generating means includes means for generating row and column control signal components; and

wherein each transducer element includes an active electronic device for combining said row and column control signal components for that transducer element.

11. The apparatus of claim 1, wherein each transducer element includes a transducer comprised of a non-linear electro-acoustic, non-linear dielectric material.

begin new paragraph

12. An acoustic imaging apparatus, comprising: a plurality of electro-acoustic transducer elements arranged in an array, each capable of transmitting an acoustic signal and generating an electrical signal representative of an incident acoustic wave;

control means having a plurality of control channels coupled to each of said plurality of transducer

elements, said control channels being fewer in number than said transducer elements;

wherein said control means generates control signals for each transducer element that when combined with the electrical receive signal of that transducer element modifies the electrical receive signal in such a manner as to permit the simultaneous processing of the modified electrical receive signals from said plurality of transducer elements;

means for combining the modified electrical receive signals of each of said transducer elements to form an array output signal; and

means coupled to said combining means for generating image data from said array output signal.

Sub A13

13. The apparatus of claim 12, wherein said array has a plurality of rows and a plurality of columns each having one of said plurality of control channels associated therewith;

insert semi-colon

said control signal generating means further including means for generating row and column control signal components; and

wherein each transducer element is uniquely and simultaneously controlled by a combination of the row and column control signal components for that transducer element.

14. The apparatus of claim 12, wherein said control signal generating means further includes means for generating a transmit control signal for each transducer element that contains a frequency based coded signal for transmission by each transducer element.

15. The apparatus of claim 14,

further comprising means for decoding a reflected frequency based coded signal.

16. An acoustic imaging system, comprising:

an array of electro-acoustic transducer elements having M rows and N columns, where M and N are positive integers and at least one of M and N is greater than one;

M row control lines, each coupled to the transducer elements in one of said M rows;

N column control lines, each coupled to the transducer elements in one of said N columns;

control means coupled to each of said M row and N column control lines for generating row control signals for each of said row control lines and column control signals for each of said column control lines, a control signal for each transducer being a combination of one of said row control signals and one of said column control signals;

a plurality of active devices, each coupled to one of said transducer elements for combining the row control signal and the column control signal of that transducer element;

means for combining the output of each transducer element to produce an array output signal; and

means coupled to said transducer output combining means for generating image data from said array output signal.

17. The apparatus of claim 16, wherein said active device is an active electronic device.

18. The apparatus of claim 17, wherein said control means includes means for generating a transmit control signal that contains a frequency based coded signal for each transducer element; and

wherein said apparatus further comprises means in communication with each of said transducer elements for

ifying a reflected coded signal received thereby t achieve a delay encoded in the coded signal, said delay for each transducer element being based on the relative position of that transducer element in the array.

19. The apparatus of claim 16, wherein said active device includes a non-linear electro-acoustic material.

20. The apparatus of claim 16, wherein said active device includes a non-linear electro-acoustic material for combining row and column control signal on transmit and an active electronic device for combining row and column control signal on receive.

21. The apparatus of claim 16, wherein said active device includes a non-linear electro-acoustic, nonlinear dielectric material.

22. A method for acoustic imaging, comprising the steps of:

providing control logic;

providing a plurality of transducer elements arranged in an array, each coupled to said control logic and capable of transmitting an acoustic signal representative of an electrical transmit control signal propagated from said control logic and generating an electrical receive signal representative of an incident acoustic signal;

generating an electrical transmit control signal for each transducer element such that the electrical transmit control signal for each transducer element contains a coded signal;

generating an electrical receive control signal for each transducer element that contains an appropriate frequency and phase shift that when combined with that transducer element's electrical receive signal permits the coherent combination of the electrical receive signals of each of the plurality of transducer elements;

combining the coherent output signals from said transducer elements so as to form a coherently combined array output signal;

decoding a combined reflected coded signal in the coherently combined array output signal to produce a decoded output signal; and

generating image data from the decoded output signal.

Sub A14

23. An acoustic imaging apparatus, comprising:

control logic;

a plurality of transducer elements arranged in an array, each coupled to said control logic and capable of transmitting an acoustic signal representative of an electrical transmit control signal propagated from said control logic and generating an electrical receive signal representative of an incident acoustic signal;

means within said control logic for generating an electrical transmit control signal for each transducer element that contains a frequency based coded signal and [cause] causing each transducer to emit an acoustic signal representative of said coded signal;

means for modifying the frequency and [chase] phase of an electrical receive signal of each transducer element for coherently combining reflected coded signals within the electrical receive signals thereof;

means coupled to said modifying means for decoding the combined reflected coded signal to achieve a time delay based on that coded signal; and

means coupled to said decoding means for generating image data from an output signal therefrom.

* * * * *

add following claims

Please add the following new claims:

Sub B1

24. An acoustic energy transmitting apparatus, comprising:

a plurality of electro-acoustic transducer elements arranged in an M row by N column 2-D array;

control circuit for propagating row and column control signals for each of said M rows and said N columns; and

wherein said transducer elements and said control circuit are configured so as to achieve a mixing at each transducer element of the row and column control signal for that transducer element in such a manner as to provide a focused acoustic signal at a given focal distance and direction from said array.

25. The apparatus of claim 24, wherein the electric signal to acoustic signal relationship and vice versa of each transducer element is non-linear.

Sub B2

26. The apparatus of claim 24, wherein said control circuit includes a control channel for each of said M rows and a control channel for each of said N columns, and wherein the number of control channels is fewer than the number to transducer elements.

27. The apparatus of claim 24, wherein said control circuit is configured such that the row and column signals for at least some of the transducer elements includes a coded signal.

28. The apparatus of claim 27, wherein said coded signal is a chirp.

Sub B3

29. An acoustic energy transmitting apparatus, comprising:

a plurality of electro-acoustic transducer elements arranged in an M row by N column 1-D array; and

control circuit for propagating row and column control signals for each of said M rows and said N columns;

wherein said transducer elements and said control circuit are configured so as to achieve a mixing at each transducer element of the row and column control signal for that transducer element in such a

manner as to provide a focused acoustic signal at a given focal distance and direction from said array; and

wherein each of said electro-acoustic transducer elements is configured within said apparatus to function in a non-linear manner in operation.

30. An acoustic energy receiving apparatus, comprising:

a plurality of electro-acoustic transducer elements arranged in an M row by N column array;

control circuit for propagating row and column control signals for each of said M rows and said N columns; and

wherein said transducer elements and said control circuit are configured so as to achieve a mixing at each transducer element of the row and column control signal for that transducer element with a resultant electrical signal corresponding to an acoustic signal incident on that transducer element; and

a filter that filters spurious frequencies output from the transducer elements;

wherein the row and column control signals and said filter are configured to achieve focused acoustic signal reception at a given distance and direction from said array.

31. The apparatus of claim 30, wherein said transducer elements and said control circuit are configured to achieve dynamic focused acoustic signal reception.

32. The apparatus of claim 31, wherein the electric signal to acoustic signal relationship and vice versa of each transducer element is non-linear.

Sub A16

33. The apparatus of claim 30, wherein said filter is a matched filter.

34. The apparatus of claim 33, wherein said matched filter includes a conjugate of a coded signal.

35. The apparatus of claim 33, wherein said matched filter includes a conjugate of a chirp signal.

36. The apparatus of claim 30, wherein the transducer elements and the control circuit are configured such that the row and column control signals for each transducer element contains a frequency and phase shift that when combined with the electric signal corresponding to an incident acoustic signal at that transducer element modifies the received electric signal in such a manner as to permit the coherent combination of the modified received electric signal from all of said plurality of transducer elements.

37. The apparatus of claim 30, wherein said control circuit includes a control channel for each of said M rows and a control channel for each of said N columns, and wherein the number of control channels is fewer than the number to transducer elements.